Precision Resistance Decade
OCM-622

Owner's Manual

ORBIT CONTROLS AG
CH-8952 Schlieren ZH

www.orbitcontrols.ch
Tel: +41 44 730 2753

INDEX

1. RESISTANCE DECADE OCM622 3

2. CONTENTS OF DELIVERY 3

3. SPECIFICATIONS 3

4. PREPARING FOR OPERATION 6

4.1 SWITCHING-ON 6
4.2 WARM-UP TIME 6

5 DESCRIPTION 7

5.1 FRONTPANEL 7
Keyboard 7
Display 7
Output Terminals 8
5.2 REAR PANEL 9

6 OPERATION 9

6.1 SWITCHING ON AND OFF 9
6.2 STANDARD MODE – CURSOR MODE 10
6.3 STANDARD MODE – NUMERICAL KEYS 10
6.4 DIRECT ENTRY 10
6.5 SET UP MODE 11
Function 11
T. unit (Temperature Units) 12
Volume 12
Baud rate (RS232 baud rate or address of the IEEE488) 12
Lightning 12
6.6 CALIBRATION MODE 13

7 VERIFICATION 15

8 REMOTE CONTROL 16

8.1 COMMUNICATION AND SYNTAXES 16
8.2 COMMANDS 17
8.3 REMOTE CONTROL VIA RS232 20
8.4 REMOTE CONTROL VIA IEEE 488 (OPTION) 20
8.5 DEMO PROGRAM 21

Date: 11.2003

1. Resistance Decade OCM622

The resistance decade OCM622 has been designed for generation of very accurate resistance values, for calibration of measuring instruments, transmitters and thermometers. It can also be used in automatic calibration setups in which the communication data ports RS232 or GPIB IEEE 488 are required.

The resistance value selected with the keyboard or through the data port is composed by 34 internal resistors optimally connected in parallel and/or serial by the internal microcontroller. The connection is made by using precision relay with extremely low thermal voltage. The used resistors are artificially aged foil resistors with extremely low temperature coefficient.

OCM622 features with very high accuracy and stability, easy control and mains independent battery operation. The instrument can be controlled from the front keyboard or remotely via RS232 or IEEE 488 data ports.

2. Contents of Delivery

RS232 version

Resistance decade OCM622-V1xxx
Power line adapter
Cable RS-232
Demo program
User's manual
Test report

IEEE488 version

Resistance decade OCM622-V2xxx
Power line adapter
Demo program
User's manual
Test report

3. Specifications

The bellow specifications are valid for functions, ranges with stated relative or absolute accuracy or specified limits.

Resistance range	**:**	1.000 00 Ω - 1 200 000 Ω SHORT, OPEN terminals (Version OCM622-Vx1xx only)
Pt temperature simulation	**:**	-200.000 °C … 850.000 °C (-328 °F … 1562 °F)
Ni temperature simulation	**:**	-60.000 °C … 300.000 °C (-76 °F … 572 °F)
Type of temp. sensors	**:**	Pt10 … Pt20000, Ni10 … Ni20000
Resolution	**:**	0.000 01 Ω for 1.000 00 … 10.000 00 Ω 0.000 1 Ω for 10.0001 … 100.000 0 Ω 0.001 Ω for 100.001 … 400.000 Ω 0.01 Ω for 400.01 … 1 200.00 Ω 0.1 Ω for 1200.1 … 30 000.0 Ω 1 Ω for 30000 … 1 200 000 Ω 0.001 °C for Pt10 … Pt300, Ni10 … Ni300 0.01 °C for Pt301 … Pt10000, Ni301…Ni 10000

Pt temperature standards	**:**	IEC 751 (1, 3850 for IPTS68) IEC 751 (1, 3851 for ITS90) US (US/JIS) (1, 3916)
Ni temperature standards	**:**	DIN 43760 (6180)
Temperature coefficient	**:**	< 1 ppm/ °C (1 Ω - 2kΩ) on terminals R4W < 1 ppm/ °C (100 Ω - 1200 kΩ) terminals R2W < 5 ppm/ °C (2 kΩ - 10 kΩ) on terminals R4W
Maximal dissipation power	**:**	0,3 W
Maximal voltage	**:**	50 V DC, 50 Vef AC on terminals R4W 120 V DC, 50 Vef AC on terminals R2W
Connection of terminals	**:**	2, 4 wire
Connection of temp. sensors	**:**	2, 3 or 4 wire
Reaction time *	**:**	6 ms
Terminals	**:**	instrument terminals diameter 4mm, gold plated
Interface	**:**	RS232 as standard (IEEE488 optionally)
Power supply	**:**	internal battery 12 V type LONG B-WP 1.9-12 power line adapter 15 V/2A (100 – 240 V)
Operating time from battery	**:**	6 hours
Reference temperature	**:**	+18 °C … +28 °C
Working temperature	**:**	+5 °C … +40 °C
Storing temperature	**:**	-10 °C … +50 °C
Housing	**:**	ALU
Dimensions (table version)	**:**	W 325 mm, H 111 mm, D 316 mm
Dimensions (19” module)	**:**	W 483 mm, H 111 mm, D 316 mm
Weight	**:**	4.5 kg

Isolation between output terminals and housing: > 2 GΩ (at 500V DC)
Test voltage between output terminals and housing: 1 kV AC / 50 Hz

* Reaction time is the time between the setting of the value at the front panel or the reception of the command from the data bus and the resistance value generated at the output terminals.

Note:

- The data shown with tolerances or with the band of limits are tested. All other values have informative character.

- The output terminals may be opened for approx. 1ms during the switching time of the relays.

Accuracy

The specified accuracy is valid after 10 minutes warm up for an ambient temperature of 23 ± 5 °C. The uncertainties include long-term stability, temperature coefficient, linearity, load and line regulation and traceability of the manufacturer's standards to the National Calibration Standards. Accuracies assigned in % are related to the set value. Specified accuracy is valid for one year.

Resistance Accuracy - R4W

Range	Accuracy
1 Ω - 400 Ω	0.003 % + 3 mΩ
400 Ω - 2000 Ω	0.005 %
2000 Ω - 10000 Ω	0.015 %

Maximal thermo voltage at theR4W terminals is < 1 μV

Resistance accuracy - R2W

Range	Accuracy
1 Ω - 2000 Ω	0.005 % + 10 mΩ
2 kΩ - 200 kΩ	0.005 %
200 kΩ - 1200 kΩ	0.01 %

Max. thermo voltage at the R2W terminals is < 5 μV for values 1 Ω to 2 kΩ. For 2 kΩ to 1.2 MΩ is < 15 μV.

Pt-Simulation Accuracy

Range	Pt 100 -R4W	Pt 200-R4W	Pt 500-R4W	Pt 1000-R4W	Pt 10000-R4W
-200 … 200 °C	0.02 °C	0.02 °C	0.02 °C	0.04 °C	0.04 °C
200 … 500 °C	0.03 °C	0.04 °C	0.06 °C	0.1 °C	0.06 °C
500 … 850 °C	0.04 °C	0.06 °C	0.15 °C	0.2 °C	0.1 °C

Ni-Simulation Accuracy

Range	Ni 100-R4W	Ni 1000-R4W	Ni 10000-R2W
-60 … 300 °C	0.02 °C	0.04 °C	0.04 °C

Short and Open simulation (version OCM622-Vx1xx only)

When function *SHORT* is selected, the output resistance is lower than 100 mΩ (typically 50 mΩ). Maximal allowed current is 500 mA.
When function OPEN is selected, the output resistance is higher than 1 GΩ. Maximal allowed voltages are 50 V rms with terminals R4W and 120 V DC, 50 Vrms with terminals R2W.

Note:
The resistance values in range 1 Ω - 1.2 MΩ are calibrated absolutely. The resistance value is not defined against SHORT position. The functions SHORT and OPEN are intended for functional checking of tested equipment only

4. Preparing for operation

OCM-622 Resistance Decade is supplied from the internal battery or from the external mains adapter, ranging from 100 V to 240 V 50/60 Hz.

The OCM-622 is laboratory device. Its accuracy is guaranteed in a temperature range 23 ± 5 °C. The instrument is designed for use in a horizontal or in a slope position. The angle of slope is determined by the handle.

After unpacking let the instrument stabilized for one hour at the specified temperature.

4.1 Switching-on

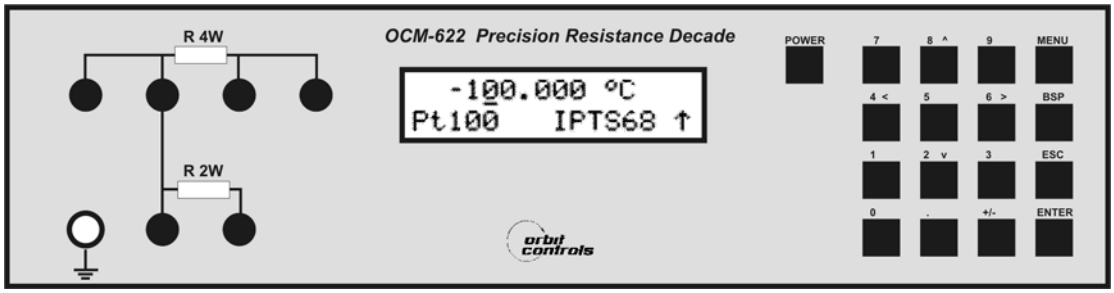
If the instrument is supplied from internal battery only, push the button POWER. If power line adapter is connected, decade will switch on automatically. After switching on internal tests are performed for approx. 3sec. The display shows the type of the instrument and the manufacturer. The display switches into the last used mode before the power has been switched-off. The factory setting is 100Ω.

4.2 Warm-up Time

The instrument operates immediately after switching on. After a 10 min. warm-up period it meets the specified accuracy.

5 Description

5.1 Frontpanel



Keyboard

The key MENU opens the setting and the calibration menu.
The key BSP cancels the latest entry.
The key ESC cancels the whole entry and/or closes the menu.
The key ENTER confirms the entry. The same key switches between the numerical keys (black print) and the cursor function (blue print). The cursor function is shown at the display with ↑ .
The key POWER switches the power ON and OFF. To switch off, the key has to be pressed twice.

Display

The alphanumerical Display shows the operation parameters. The upper line shows the main function, the lower line shows the auxiliary parameters. The right down corner displays following functions:

↑ - Cursor Keys – blue print at the keys.

- Remote operation via RS232 or IEEE488 (REMOTE)

- Battery has to be charged

- Charger in operation

Output Terminals

The output resistance is available in four (R4W) or two (R2W) connections. The upper four terminals R4W permits 2 and 4 wire connection in the resistance mode of operation, and 2, 3 or 4 wire connection when the decade is used as Pt/Ni temperature simulator. The range of setting is 1 Ω to 10 kΩ. The max. resistance value is determined by the selection of the type of the output terminals 4W or 2W. The two wire connection R2W permits the settings from 1 Ω to 1.2 MΩ.

The terminals are automatically switched between R2W and R4W in accordance with the set resistance value. Low resistance values are connected always to R4W terminals. The switching level between R4W and R2W is programmable from 0 Ω to 10 kΩ in the MENU parameter 4W < 2W. Recommended 4W < 2W value is 2000Ω.

Active terminals are indicated with LED at the front panel.

The terminal “GROUND” is connected with the cabinet.

5.2 Rear Panel

The rear panel contains the charger jack and the data bus connector.

6 Operation

6.1 Switching ON and OFF

The instrument is always ON when the charger is connected to the mains. When powered from internal battery, the instrument has to be switched-on with the POWER key. To switch-off, press the POER key twice. The instrument switches-off automatically when during 20 minutes no key is operated. One minute before the power is switched-off, a beep tone sounds. Low battery is indicated by ▯ symbol at the display.

6.2 Standard Mode – Cursor Mode

When switched-on, the standard mode is activated and the display shows:

The upper row shows the simulated temperature [°C] or the generated resistance [Ω]. The lower row shows the temperature scale IPTS68, ITS90 according to the IEC751 or US JIS standards. The arrow symbol informs about the activated cursor function of keys 2, 4, 6, 8 (blue prints). With the keys ↑ ↓ the selected position can be incremented or decremented. With the keys ← → the cursor can be moved left or right. The key ENTER switches between the cursor and numerical type of entry. When the key MENU is pressed, the SET UP function is activated.

6.3 Standard Mode – Numerical Keys

The upper row shows the simulated temperature [°C] or the generated resistance [Ω]. The value can be directly overwritten with the keyboard and confirmed with ENTER. The key ENTER switches between the numerical and the cursor entry.

The lower row shows the sensor type at the temperature simulation (Pt-100, Ni 1000 etc.). The corresponding norm is shown when the Pt elements are selected US/JIS for the US-Norm, IPTS68 or ITS90 for the european norm IEC 751.

With the key MENU the setting mode is activated.

6.4 Direct Entry

With numerical keys the temperature value (or resistance) can be directly entered. The recently entered value is displayed in brackets under the actually value. Press the key ENTER to confirm the setting. The key ESC terminates the entry. The key BSP cancels the last entered value.

6.5 Set Up Mode

This mode permits setting and displaying of some auxiliary parameters. To enter this mode, push the key MENU in the standard mode. With the cursor keys ↑ ↓ following items can be displayed in the setup menu:

Function

With the keys ← → following functions can be activated:

R - Resistance. Range 1.00000 Ω to 1200000Ω.

Pt (68) - Pt thermometer according to IEC 751 (Temp. Scale IPTS68, coeff.1,3850).
Range: -200 °C to 850 °C (-328 °F to 1562 °F). The zero value R0 (resistor value @ 0°C) can be set from 10 Ω to 20 000Ω.

Pt (90) - Pt-thermometer according to IEC 751 (Temp. Scale IPTS 90, coeff. 1,3851). Range: -200 °C to 850 °C (-328 °F to 1562 °F). The zero value R0 (Resistor value @ 0°C) can be set from 10 Ω to 20 000 Ω.

Pt (US) - Pt thermometer according to US-Norm US/JIS, coeff. 1,3916. Range: -200 °C to 850 °C (-328 °F to 1562 °F). The zero value R0 (Resistor value @ 0°C) can be set from 10 Ω to 20 000 Ω.

Ni - Nickel thermometer according to DIN 43760, coeff. 6180. Range: -60 °C to 300 °C (-76 °F to 572 °F). The zero value R0 (Resistor value @ 0°C) can be set from 10 Ω to 20 000 Ω.

User - Used defined range and curve. Standard is NTC Thermometer with following polynom installed:
R(T) = 330*exp (-4050*((1/298,15)-(1/(T+273,15))))
Range: -30 °C to 110 °C.

Short - simulates short of the output terminals. Function Short is Option.

Open - simulates open of the output terminals. Function Open is Option.

The positions appear at the lower line. After ENTER they appear in the upper line.

R0 (Pt,Ni) (Resistance at 0°C)

The parameter R0 for temperature sensors can be set. The value R0 is valid for both Pt and Ni sensors. A new value can be entered with the keyboard. The permitted range is from 10 Ω to 20 000 Ω. The new value is stored with ENTER.

4W < 2W (the highest resistance value on R4W terminals)

This function permits settings of the resistance value when the output terminals switch from R4W to R2W. Resistance values higher than 10 000 Ω are available only on terminals R2W. Lower values than 10 000 Ω are available at the R4W terminals. At the R2W terminals is the resistance also available but with lower accuracy. The range of setting is 10 to 10000 Ω.

T. unit (Temperature Units)

With the keys ← → °C or °F can be selected. The key ENTER memorizes the selection.

Volume

With the keys ← → the beeper intensity of the keyboard can be adjusted. The selection is from 0 to 15. The key ENTER memorizes the selection.

Baud rate (RS232 baud rate or address of the IEEE488)

Instruments with RS232 can have the baud rate selected with the keys ← → for 300, 600, 1200, 2400, 4800, 9600 or 19200 bd.

Instruments with IEEE488 data port can select the address from 0 to 30. The key ENTER memorizes the selection

Lightning

The display backlight can be switched on or off. With the keys ← → OFF (lightning is switched off), 30 s (lightning is switched on for 30 sec. after last key entry), 5m (lightning is switched on for 5 minutes after the last key entry) or ON (lightning is switched on). The selected parameter is displayed in the lower row. The key ENTER memorizes the selection. If the instrument is supplied from the external power adapter, the lightning is switched on all the time.

Note: The display backlight influences significantly the operating time of the internal battery. When the backlight is not used, the battery operation time is about 50% longer.

Calibration mode, password setting

The calibration password is a five digit number, which must be entered to access the calibration mode. The factory setting is “00000”. It is recommended to change the password and note it. Without the password the calibration can not be performed.

The Password can be changed and the new password can be entered directly from keyboard. Enter 00000 and the new password. Confirm with ENTER.

Serial number

The serial number of the instrument is entered during the production and can not be alternate.

6.6 Calibration Mode

The precision resistors of the decade can be recalibrated. The access to the calibration mode is permitted after double pressing of the key MENU from the standard mode or after single pressing from the SETUP mode.

The correct password must be entered before calibration. Without correct password the access to the calibration mode is refused. Default factory set calibration code is “00000”. Return to standard mode with the key ESC.

Recalibration procedure contains precision measurements of 36 basic resistors and entering their new values into the memory. The keys ↑ ↓ can be used for the settings.

Following table shows the nominal values during the calibration and the required recalibration accuracy:

Etalon (Terminals)	Nominal value	Calibration accuracy	Etalon (Terminals)	Nominal value	Calibration accuracy
R00 (R 4W)	2,0 Ω	1 mΩ	R18 (R 4W)	398 kΩ	40 Ω
R01 (R 4W)	3,9 Ω	1 mΩ	R19 (R 4W)	780 kΩ	80 Ω
R02 (R 4W)	7,8 Ω	1 mΩ	R20 (R 4W)	1540 kΩ	200 Ω
R03 (R 4W)	15,4 Ω	1 mΩ	R21 (R 4W)	3020 kΩ	400 Ω
R04 (R 4W)	30,5 Ω	1 mΩ	R22 (R 4W)	5920 kΩ	1 kΩ
R05 (R 4W)	60,5 Ω	1 mΩ	R23 (R 4W)	12 MΩ	5 kΩ
R06 (R 4W)	120 Ω	2 mΩ	R24 (R 4W)	23 MΩ	50 kΩ
R07 (R 4W)	237 Ω	3 mΩ	R25 (R 4W)	46 MΩ	200 kΩ
R08 (R 4W)	464 Ω	6 mΩ	R26 (R 4W)	85 MΩ	500 kΩ
R09 (R 4W)	909 Ω	15 mΩ	R27 (R 2W4W)	1780 Ω	40 mΩ
R10 (R 4W)	1780 Ω	30 mΩ	R28 (R 2W4W)	3830 Ω	80 mΩ
R11 (R 4W)	3480 Ω	100 mΩ	R29 (R 2W4W)	7870 Ω	100 mΩ
R12 (R 4W)	6870 Ω	250 mΩ	R30 (R 2W4W)	15,8 kΩ	200 mΩ
R13 (R 4W)	13,5 kΩ	500 mΩ	R31 (R 2W4W)	34 kΩ	500 mΩ
R14 (R 4W)	26,6 kΩ	1 Ω	R32 (R 2W4W)	75 kΩ	1 Ω
R15 (R 4W)	52,2 kΩ	5 Ω	R33 (R 2W4W)	150 kΩ	4 Ω
R16 (R 4W)	103 kΩ	10 Ω	R34 (R 2W4W)	301 kΩ	10 Ω
R17 (R 4W)	202 kΩ	20 Ω	R35 (R 2W4W)	602 kΩ	20 Ω

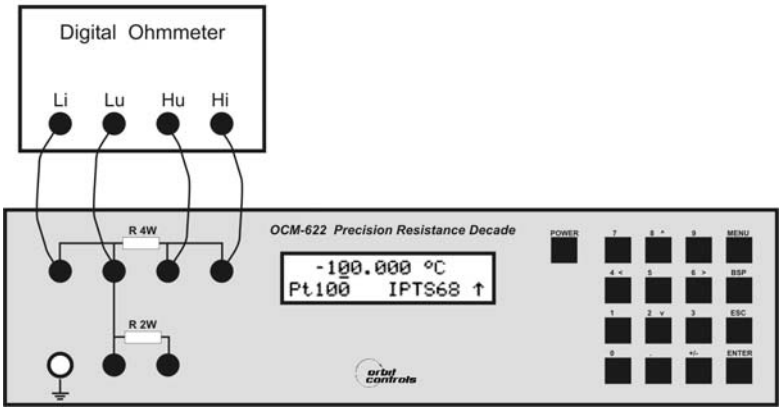
The process of calibration contains the measurement of the single resistors and writing their values into the memory. The Etalon is selected with ↑ ↓.

- Measure the resistance with four wire method.
- Activate the keyboard with ENTER.
- Enter the new value. The first line shows the original value, the lower line the new value.

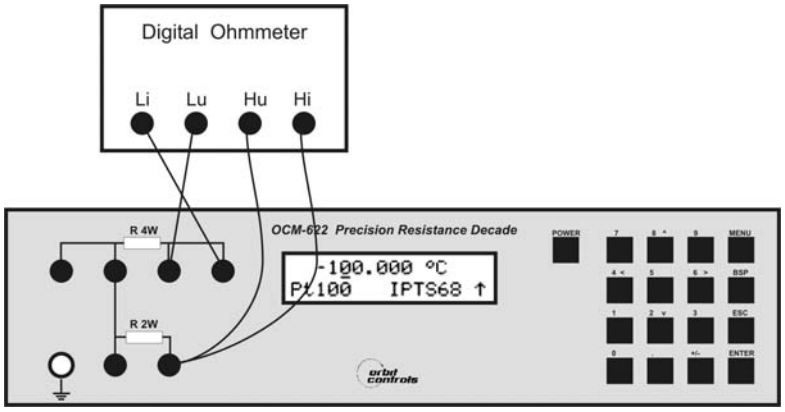
```
R00   62.00000 Ω
      62.0200
```

- Press ENTER to memorize the new entry.
- Repeat for all Etalons.

Recommended schematic for R00 to R26 (Terminals R4W)



Recommended schematic for R27 to R35 (Terminals R2W)



7 Verification

The verification procedure is described in this chapter. It is based on resistance measurement on the output terminals with standard multimeter in recommended points.

Required equippment

- Ohm-meter with accuracy of 0.001%, ranging frrom 1 Ω to 1.2 MΩ (e.g. Wavetek 1281).

Instrument Setting

Switch into the resistance mode. Connect the multimeter with 4 cables to the output terminals.

Measuring Steps

- output resistance on terminals R4W
- output resistance on terminals R2W

Procedure

Use the following procedure to perform the parameter verification test.

1. Switch both instruments on and let them for 1 hour stabilise in the laboratory ambient temperature 23±2 °C. Connect the terminals R4W to the ohm-meter. Set value 4W<2W to 10 kOhm in the SETUP menu.
2. Check resistance values as shown in table I.

Table : Max. Deviation on terminals R 4W

Nom. Value [Ω]	Max. deviation [mΩ]
1.00000	3.03
2.00000	3.06
5.00000	3.15
10.00000	3.3
20.0000	3.6
50.000	4.5
100.000	6.0
200.00	9.0
500.00	25
1000.0	50
2000.0	100
5000.0	750
10000.0	1500

3. Connect the ohm-meter to R2W terminals. Use four-wire connection to 10 kOhm. Above 10k two or four wire connection can be used. Set function 4W<2W to 0 Ω in the SETUP menu.

4. Check the resistance value in points according to Table II.

Table ***II. Maximal deviation on terminals R 2W***

Value [Ω]	Max. deviation [Ω]
1.00000	0.01
10.00000	0.011
100.000	0.015
1000.0	0.060
2000.0	0.1
5000.0	0.25
10000.0	0.5
20000.0	1.0
50000	2.5
100000	5.0
200000	20
500000	50
1000000	100
1200000	120

8 Remote Control

The standard version is equipped with RS232 data port. The IEEE488 data port is described under 8.4. The commands for both versions are the same.

8.1 Communication and Syntaxes

The communication between the instrument and the PC consists of flow of periodically alternating commands type command-response or query-response. The command is always a letter followed by parameter and ended by control sign <cr> or <lf>. The response is always ended with <cr> <lf>.

Syntax description

<DNPD> = Decimal Numeric Program Data. This format is used to express decimal number with or without the exponent.

<CPD> = Character Program Data. Usually represent a group of alternative character parameters, e.g. {0 | 1 | 2 | 3}.

? = Flag indicating a request for the value of the parameter specified by the command. No other parameters than the question mark can be used.

(?) = Flag indicating a request for the parameter specified by the command. This command permits a value to be set as well as requested.

<cr> = carriage return. ASCII code 13. This code executes the program line.

<lf> = line feed. ASCII code 10. This code executes the program line.

8.2 Commands

Value setting / reading
A (?) <DNPD>

This command sets the resistance or the temperature values.

<DNPD>
It represents the resistance value in Ohm or simulated temperature in °C. The parameters of temperature can be set with negative or positive sign. The resistance parameters can be set only with positive sign only.

In the Control Mode, the instrument confirms the correct setting with „Ok <cr><lf>".

In case of query, OCM-622 returns the resistance/temperature values in the same format as it is on the display, e.g. -120 °C is returned as -120.000 <cr><lf>. Positive numbers are sent without the polarity sign.

Example:

If OCM-622 is in the temperature simulation function, the command „A123.564 <cr>" sets the temperature to 123.564 °C. In the resistance mode the value of 123.564 Ω is at the output terminals.
If query „A?<cr>" is sent, OCM-622 responds „123.564<cr><lf>".

Setting of functions
F <CPD> { 0 | 1 | 2 | 3 | 4 | 5 | S | O }

Following functions can be set:

- 0 resistance mode
- 1 Pt (68) temperature sensor simulation
- 2 Pt (90) temperature sensor simulation
- 3 Pt (US) temperature sensor simulation
- 4 Ni temperature sensor simulation
- 5 User temperature sensor simulation
- S Short simulation (extra ordered option)
- O Open simulation (extra ordered option)

OCM-622 confirms „Ok <cr><lf>".

Example:
„F1<cr>" sets Pt100 sensor simulation.

Switching off
P0

This command will switch off the instrument. The command is executed if OCM6-22 is supplied from internal battery only, without the external battery charger. Correct execution is confirmed with string „Ok <cr><lf>".

Example:
„P0<cr>" switches decade off.

R0 setting / reading
R (?) <DNPD>

This command sets the resistance value R0 at the temperature 0 °C. The value R0 is valid for all types of simulated temperature sensors.

<DNPD>
It represents resistance value R0 in Ω. The limits are shown in chapter „Specifications". OCM-622 confirms the execution with a string „Ok <cr><lf>". In case of query OCM-622 returns the value in Ω.

Example:

„R100 <cr>" sets R0 to 100 Ω (Pt100, Ni100).

After query „R? <cr>" OCM-622 returns „100<cr><lf>".

Temperature unit setting
U <CPD> {0 | 1}

This command sets the temperature units:
- 0 degree Celsius °C
- 1 degree Fahrenheit °F

OCM-622 confirms with „Ok <cr><lf>".
Example:

„U0<cr>" sets °C.

Status reading
V?

OCM-622 returns the status in form „FxUx <cr><lf>". „x" are values corresponding to the actual status of the instrument.

Example:

After query „V?<cr>" OCM-622 returns for example string „F2U0<cr><lf>", which means Pt (90), °C actual setting.

Setting of the resistance value for switching the terminals 2W/4W
W (?) <DNPD>

This command sets value of the resistance for switching the output terminals from R4W to R2W and return.

<DNPD>
This represents the resistance value in Ω. The limits are shown in chapter “Specifications”. OCM-622 confirms the execution with string „Ok <cr><lf>”. In case of query OCM-622 returns the value in Ω.

Example:

„W2000 <cr>” sets value to 2000 Ω.
After query „W?<cr>” the instrument returns a string „2000<cr><lf>”.

I/D (device identification)
***IDN?**

The response contains the name of the manufacturer, the model, the serial number and the firmware version.

Example:

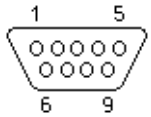
If query „*IDN?<cr>” OCM-622 returns:
„ORBIT,M622,462351,2.4 <cr><lf>“.

When unknown command is received, OCM-622 returns "? <cr><lf>“. Correctly executed command is confirmed with "Ok <cr><lf>. When a correct query is received, OCM-622 responds in the above described form. All commands must be terminated with <cr> or <lf>. Small and capital letters are allowed.

8.3 Remote Control via RS232

The transmission baud rate can be selected from 300 to 19200 Bd. The telegram contains 8 bit, no parity, 1 Stop. For the data flow the hardware handshake (RTS/CTS) and the program handshake (XON/XOFF) are switched-off. The RS 232 is isolated.

RS-232 connection



Pin	Text	Type	Description
2	TXD	Output	Sender
3	RXD	Input	Receiver
5	GND	-	GND

Connector type: D-SUB 9, MALE

Cable between OCM622 and PC (configuration 1:1)

PC	D-Sub 1	D-Sub 2	OCM-622
Receiver	2	2	Sender
Sender	3	3	Receiver
GND	5	5	GND

8.4 Remote Control via IEEE 488 (Option)

IEEE488 contains following functions:

DIO1 1 13 DIO5
DIO2 2 14 DIO6
DIO3 3 15 DIO7
DIO4 4 16 DIO8
EOI 5 17 REN
DAV 6 18 GND (TW PAIR W/DAV)
NRFD 7 19 GND (TW PAIR W/NRFD)
NDAC 8 20 GND (TW PAIR W/NDAC)
IFC 9 21 GND (TW PAIR W/IFC)
SRQ 10 22 GND (TW PAIR W/SRQ)
ATN 11 23 GND (TW PAIR W/ATN)
SHIELD 12 24 SIGNAL GROUND

SH1, AH1, T5, L3, RL1, DC1

The instrument recognizes following commands:
DCL Device Clear – sets the instrument into the basic function.
SDC Selected Device Clear – same as DCL.
GTL Go to Local – terminates the remote control.
LLO Local Lock Out – switches-off the keyboard.

The IEEE488 commands are identical with the RS232 commands.

8.5 Demo Program

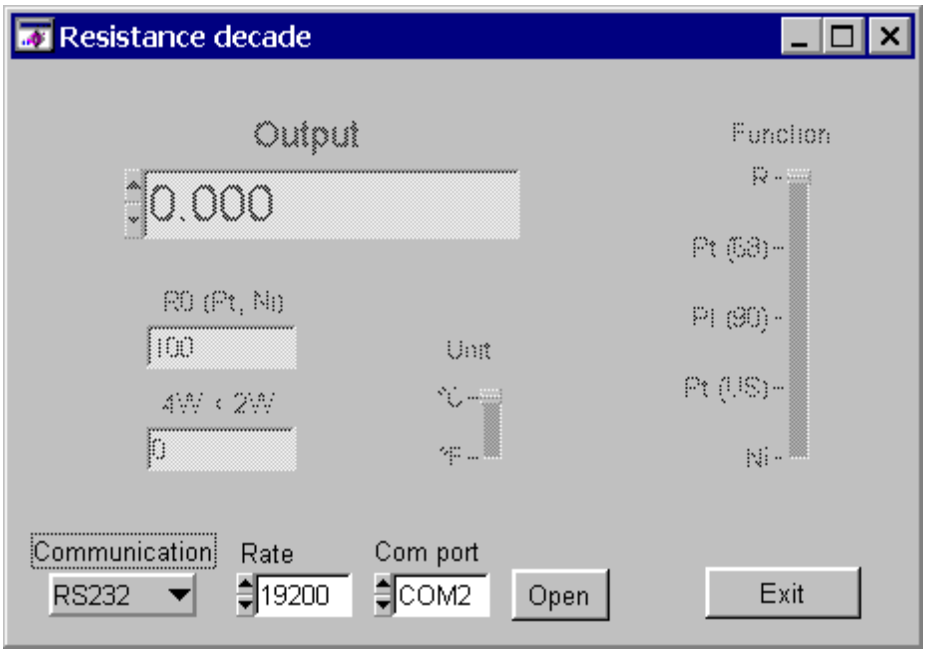
A simple program is supplied with OCM-622 which supports the control via the data ports RS232 and IEEE 488. The installation diskette contains the program for WIN95/98/ME/NT/2000/XP. For IEEE488 the Demo Program requires properly configured National Instruments IEEE488 card.

Installing the program

After SETUP.EXE, the installation program asks for the destination directory (pre-defined is R Decade) and executes the actual installation. The UNINST.EXE program is also enclosed for deleting the directory from the system.

Program description

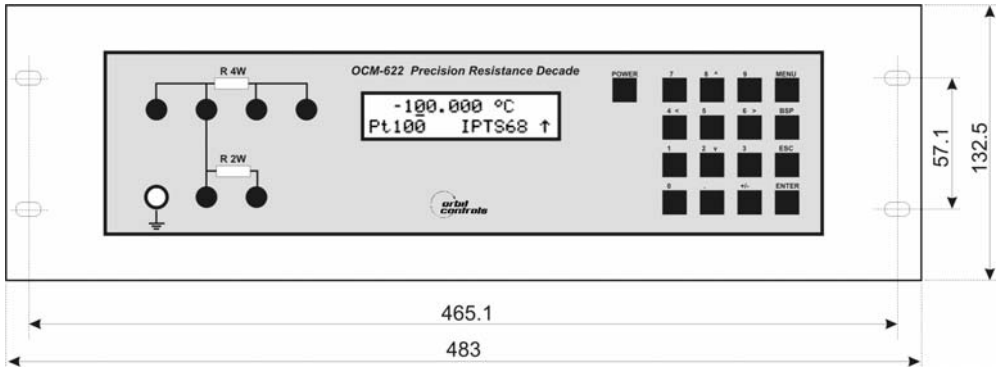
After starting the program “R decade”, following control panel is displayed:



In „Communication“select RS232 or IEEE488. Set the COM and the baud rate. When the IEEE488 is used, set the address. Start the program with “Open”. The program checks if the instruments is connected. If the instrument is found, it can be controlled from the PC. Use „Output“ to enter the required value or select it with the arrows up or down by using the mouse.
Press “Exit” to terminate the program.

9. 19“ Rack

OCM-622 can also be ordered for 19“ rack mount.



10. Electric Function

The internal resistors are switched in a binary code by using precision relays with very low thermal voltage. The resistors are artificially aged and for high accuracy of the Tempco selected. The LED at the front shows that the selected resistor value is connected to the terminals. The metal cabinet is connected to the mains GND.

The 16 bit controller permits the settings and the selection of the mode via the keyboard or the data ports. It supports also the display showing the parameters and the output values. The electronics is supplied from internal battery. A line battery charger is enclosed.

11. Mechanical Construction

The instrument is enclosed in aluminium cabinet. The keyboard, the display and the output terminals are located on the front panel. External power supply jack and RS-232 connector are located on the rear panel. Internal battery is fixed to the rear panel inside the cabinet.

11.1 Battery maintenance

The sealed lead-acid maintenance-free long-life 12V, 2.6Ah battery requires approx. 40 hours for full charge. It also has to be charged when the instrument is not in use for longer than 3 month.

To replace the battery, use following steps:

- Disconnect the external power supply adapter and RS-232 (IEEE488) cable.
- Switch off the instrument.
- Take out the 4 screws located in the corners of the rear panel.
- Remove the top cover.
- Disconnect connectors and release the battery.
- Replace the battery with the same type.
- Close the cabinet the opposite way as it has been opened.

12. Ordering Information

Data Output

OCM622-V1xxx	RS232
OCM622-V2xxx	IEEE 488

Additional Options

OCM622-Vx0xx	none
OCM622-Vx1xx	Short/Open Function

Cabinet

OCM622-Vxx0x	table version
OCM622-Vxx1x	19“ Rack version